TECHNOLOGY DEPT.

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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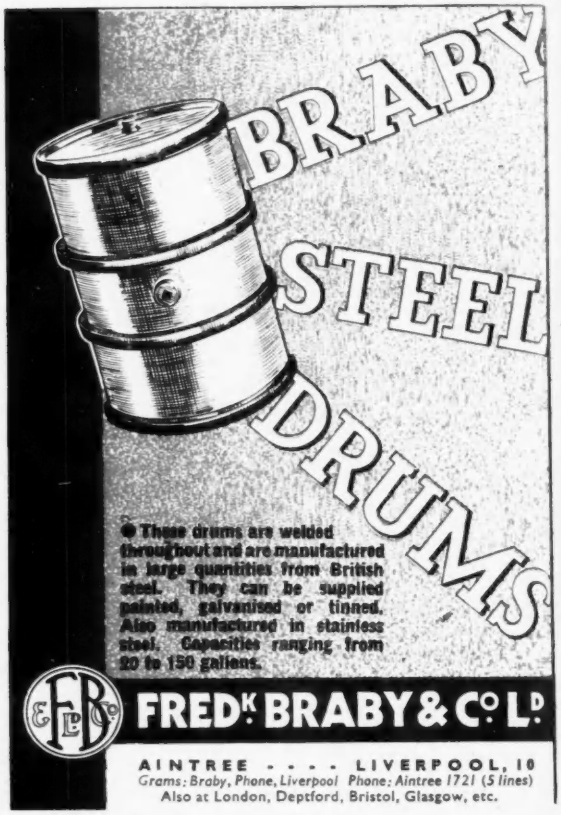
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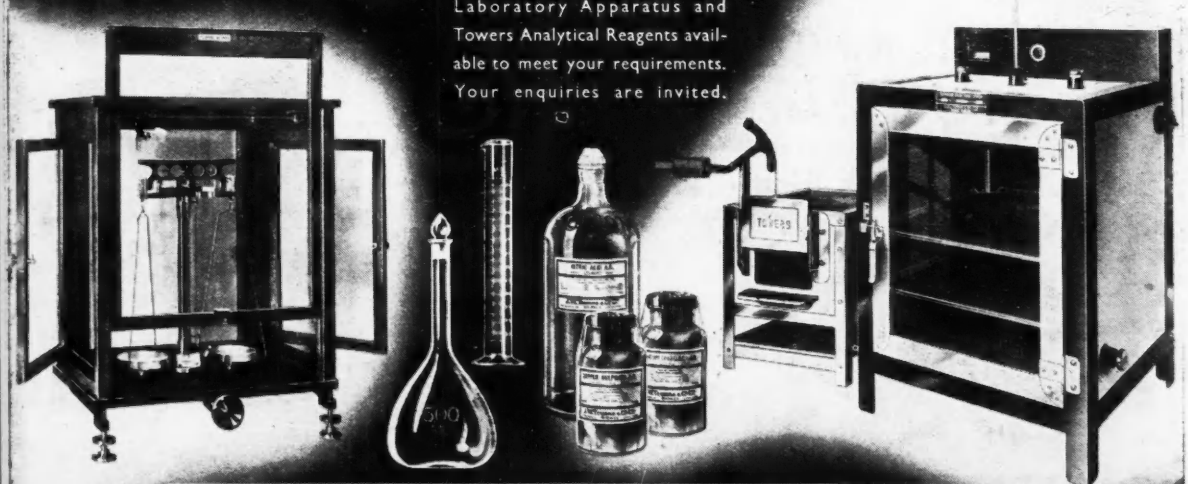

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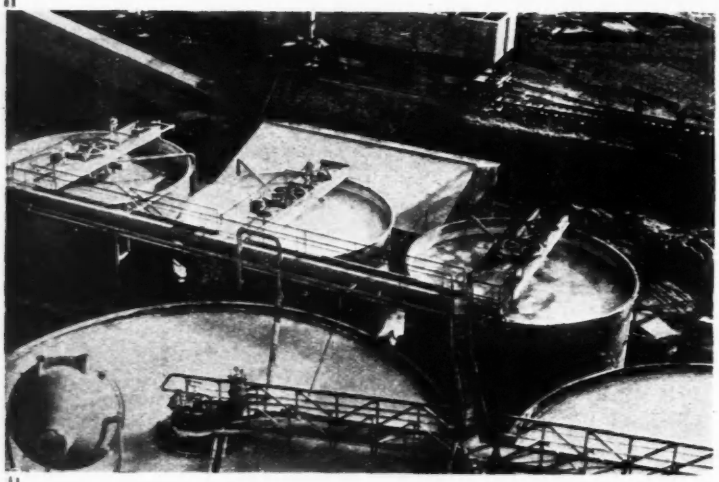

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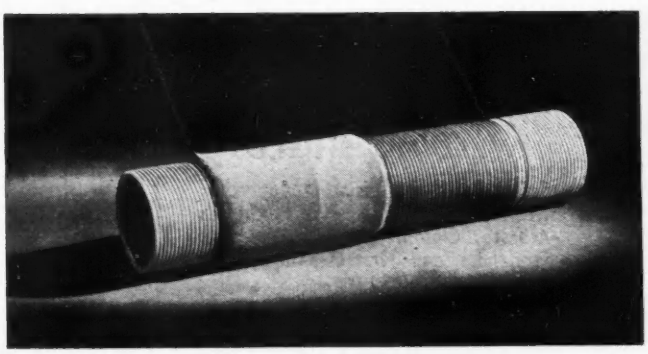

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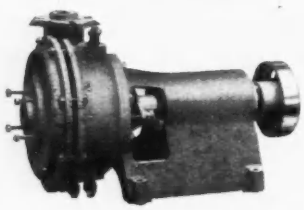

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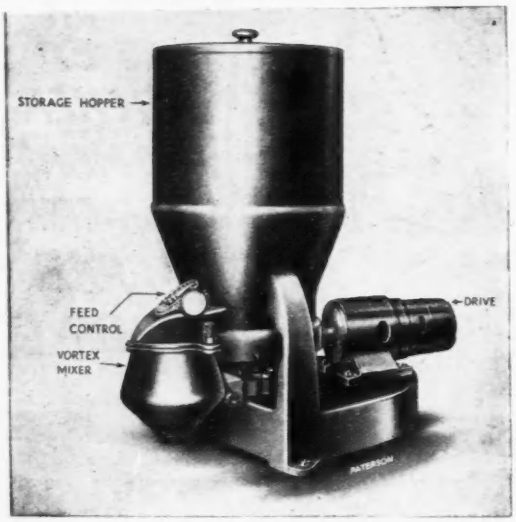

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The Chemical Age

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Business Organisation After the War

ONE of the minor discomforts of war is that it lets loose upon an undeserving public a flood of schemes that occur to private individuals as "aids" to our war effort. These schemes are all put forward quite solemnly as contributions to the task of winning the war, though they may, in their fundamental origin, range all the way from genuine schemes proposed by responsible people to wild socialistic changes which their promoters hope to see introduced for dark reasons, and to remain with us for generations thereafter. Nationalisation of mines and public utilities is one of the regular recipes advocated, even though the disastrous effects of Government control during the war of 1914-18 remained with us for many a year afterwards. Most schemes of this character can be dismissed without much consideration, but when an authority such as Sir William Beveridge is allowed to propose in so responsible an organ as *The Times* a scheme for drastic and revolutionary changes in business organisation, it is necessary to examine the proposals carefully.

Three proposals are put forward under the supposition that the recent changes in the Government can only be of little avail unless they lead to changes in spirit and of policy. For the time being we may neglect two of the changes demanded by Sir William Beveridge and concentrate on the first. This is based on the premise that the present organisation of business and the present financial system are unable to provide the necessary output of munitions, or to maintain our war effort at its highest peak. "We have continued to rely upon individual capitalism with its accompanying machinery of wage bargaining. . . . We have left vital production in the hands of individuals whose duty it was to consider not solely the needs of the nation at war, but . . . what would be the position of their businesses after the war. . . . We have treated our workpeople as if they were 'economic men,' unamenable even in war to any motive stronger than personal gain. Meanwhile the State has set out to direct the employment of all men without taking responsibility for ensuring a fair distribution of income. The main evils of this economic policy . . . lie partly in the indefensible and dangerous inequalities which have resulted between civilians and members of the fighting forces, between different civilians, and between different businesses." On the basis of this criticism Sir William Beveridge calls for two changes; first, for the State to take direct responsibility for the control of vital industries and for the distribution of income; second, for assertion of the principle that service rather than personal gain should be the mainspring of war effort in industry as in fighting.

It is of small moment that Sir William Beveridge calls for these changes for the war only and visualises a return to present conditions after the war. He must know that there can be no such change back. The effort of changing back after the last war from even a moderate control of this character ruined the coal industry and caused widespread distress for nearly a generation. Is it true that individual capitalism is unable to deliver the munitions that we want? The experience of this country and of America gives the lie direct to any such assertion. A great deal of the extent to which our war output falls short of its theoretical maximum is due to defects of organisation for which the Government and the Civil Service must ultimately be responsible, even though perhaps they cannot be blamed for inevitable defects in so huge an undertaking. Under the direct control visualised by Sir William these defects would only be multiplied. There can be no doubt that the individuals who have a lifetime of experience in the organisation of their business can do better in getting high outputs than the inexperienced civil servants whom Sir William Beveridge desires to put in control.

The motive of private gain has disappeared from our war industries by reason of the Excess Profits Tax and so also, unfortunately, has the basic motive for efficiency. It is a tribute to the patriotism of British industry in general that, although no private gain is allowed over and above that of normal peace years, business heads and their staffs are working harder than ever before in their lives and are delivering such a volume of munitions that the Washington Correspondent of *The Times* on the day following Sir William Beveridge's article stated that: "responsible men in the field of war production declare that the Anglo-American output is now running higher than actual and potential Axis production," leaving out of account the production of Russia. The operative word is "now," *i.e.*, before the U.S. has approached its full output. It seems clear, therefore, that the "capitalist" system condemned by Sir William Beveridge is delivering the goods and that there is no justification for any suggestions that at this critical moment the whole of this machinery should be dislocated in order to introduce socialistic ideas of a theoretical character.

Personal gain is certainly not the mainspring of our war effort. No one will deny that business heads are doing their best to maintain their organisations in such a state that they will be able to function again after the war. Sir William himself emphasises the need for planning ahead for peace, and we should be in a pretty pickle when the war ends if our great industrial enterprises had been dissolved or crippled as they would undoubtedly be if ruled by bureaucrats.

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NOTES AND COMMENTS

Fuel Efficiency Training

AT the suggestion of the Fuel Efficiency Committee, the Mines Department, with the co-operation of the Board of Education, has organised a scheme of free training in fuel efficiency. Enrolments for the first classes have made it clear that there is a real need for training of this sort in order to obtain the best possible results from the country's supplies of fuel. Two separate but concurrent courses have been arranged at each centre, the first comprising from six to twelve discussion lectures for management staff, and the second, a series of six demonstrations on steam raising plant for boiler-house attendants. Classes have been started in Manchester, St. Helens, Bolton, Birmingham, Coventry, Wolverhampton, and Stoke-on-Trent, where the Technical Colleges have provided training facilities on the basis of a syllabus drawn up by the Fuel Efficiency Committee. The response from industry in these areas has been almost overwhelming, and as a result, it has been decided to extend the scheme to some thirty other Technical Colleges and Universities in the leading industrial centres throughout the country.

A Practical Syllabus

THE practical nature of the training is indicated by the following brief summary of some of the main points covered in the lectures. A survey of the national fuel position will impress, in the first place, the need for conserving fuel and inculcate the methods of effecting economies. Then, among the principal "headings" of the syllabus, will be included: the chief properties and uses of the principal natural and prepared fuels; principles of combustion; forced and natural draught; steam raising plant; care of the fuel bed, clinkering, automatic stokers; main principles of heat transmission treated from the standpoint of the utilisation of heat in boilers and industrial furnaces; properties and uses of refractories and insulators; sources of waste heat and their detection and stoppage or utilisation; construction and operation of industrial furnaces, including atmosphere control and measures to improve efficiency applicable during rebuilding; and methods for measuring the distribution of heat and heat flow.

A Guide to Paper Problems

A USEFUL guide to paper restrictions as affecting traders is included in the spring issue of *Eupax Pars*, published by William Sessions, Ltd., the well-known York printers. Circulars, catalogues, loose insets, showcards and counter displays are all affected, but there are no restrictions on export printing. Labels on goods are permitted, provided that they are necessary for the identification, transport, or use of the article to which the label is affixed; and that the matter printed on the label cannot reasonably be printed on the wrapper or container itself, or the wrapper or container is intended to be returned. Labels on goods must not exceed an area of 20 square inches, bands on tins being restricted to 1⅝ inch deep. Hints on saving paper include the suggestion that space on envelopes should be used for additional printing, while the cover of a catalogue can often be dispensed with if the envelope is suitably printed. In view of the ban on posters, there are interesting possibilities in a new form of advertising which Messrs. Sessions have produced under the name of "Miniposters." These attractive little stamps are already being used in 14 industries, and similar labels for export publicity are available in six languages.

Commercial Entomology

CHEMICAL means of dealing with deleterious insects have a special importance in war time, when the preservation of food and other commodities becomes more than a merely economic question. The recent lecture delivered by Professor J. W. Munro, Director of the Biological Field Station, Imperial College of Science and Technology, Slough, on "The Entomology of Commerce" deserves, therefore, a special mention. The occasion, by the way, was the recent annual meeting of the Society of Public Analysts. Professor Munro called attention to some recent occasions in which the ravages of certain insect pests had been traced to economic causes, *e.g.*, troubles from wood-boring insects due to importation of long stored timber, and appearance of new types of infection in tobacco due to certain importations from Africa. Combating insect pests by cleanliness and rigorous control of storage conditions, he pointed out, may suffice with materials initially sound, but is inadequate with materials imported in a highly infected condition. Destruction by heat has been employed against wood-boring insects. Low temperatures are used in the tobacco trade; the resistance depends on the rate of cooling, and improved results have been obtained by a second cooling after an intermediate warming. Studies of the insecticidal action of some inert powders have given promising results; the action appears to be due to withdrawal of moisture. In discussing chemical insecticides that act in vapour form, the lecturer drew attention to the influence of various factors, such as temperature, and inequalities of distribution, and gave some results obtained in studying them. Investigations are in progress to elucidate the mechanism of insecticidal action and so to ascertain what properties are necessary in an insecticide to enable it to penetrate the epicuticle and cell-walls of an insect, and upset the normal processes within.

Science *v.* Post-War Famine

THE British Association is maintaining its reputation for utility and universality, and the conference on the post-war reconstruction of peasant agriculture in Europe, held at the close of last week, will certainly be recorded as one of the most valuable of the activities organised by the Association. The conference, by the way, was postponed for a week owing to the death of Sir William Bragg. No better chairman for the occasion could have been found than Sir John Russell of Rothamsted, for he is not only one of the greatest living agricultural scientists, but he is also human above all; and there can be no doubt that to be successful, any scientific approach to agricultural problems must be invested with humanity. Another point in Sir John's favour is that he is intimately acquainted with conditions on the land in the U.S.S.R., by far the biggest agricultural unit in the Eastern Hemisphere. He envisages a staggering amount of wanton damage which will be inflicted by the Germans before they quit the lands they now infest. The result will be a colossal opportunity for the agricultural scientist to rebuild. A good augury for the success of this rebuilding was the presence at the conference of delegates from practically every European country, all national rivalries being shelved before the common need to re-establish the productivity of the soil. It is significant that all were agreed that no stable foundation of future peace could be laid without the establishment of a free and contented peasantry. Let scientists make sure that they play a leading part towards attaining this end.

New Metal Deactivator

A METAL deactivator designed to increase the storage stability of petroleum distillates has been developed by the Petroleum Chemicals Section of E. I. du Pont de Nemours and Co., Inc. It is recommended for both petrol and fuel oils containing soluble metallo-organic compounds or soluble metal salts of organic acids in which it will counteract the oxidising or catalytic effect of those contaminants. The acid constituent of the new product is N:N'-disalicylidine-1:2-diaminopropane. This molecule forms stable complex compounds with various metals, such as copper, in which the ionisation, as well as the catalytic activity of the metal atoms is greatly reduced. This renders them inactive in the oxidation process of the hydrocarbons. N:N'-disalicylidine-1:2-diaminopropane is a viscous liquid at ordinary atmospheric temperature, and is therefore made suitable for general use by diluting four weight parts of it with one part of xylol.

ELECTROSTATIC PRECIPITATION

Wide Applications in the Chemical Industry

by D. D. HOWAT, B.Sc., Ph.D., A.I.C., A.Inst.M.M.

THE removal of dust and fume from gases is a problem frequently encountered in chemical engineering. Demand for the speed-up in processes and increased efficiency of plants has aggravated this difficulty. The gases from cement kilns, pyrites burners, acid towers, and coking retorts comprise a more or less stable dispersion of minute particles of solid or liquid, and it is the removal of the dispersed particles from these aerosols, as the gaseous suspensions are termed, that constitutes the problem. The dispersed particles may be of no value in themselves, but their release into the atmosphere may cause a health hazard or destroy the amenities in an urban area. Frequently the gases from a smelting furnace will carry valuable metal particles, whose loss is a grave economic factor. Further, to ensure maximum efficiency and cleanliness of burners, pipes, etc., all suspended particles of tar must be removed from coke-oven and town gas before use.

Various methods of removing the dispersed particles have been adopted—cyclones, washers, and filters finding varied fields of application. In many chemical processes the size of dispersed particles may vary over a wide range, sometimes including a large percentage of particles sufficiently small to be affected by the Brownian movement. For the treatment of such minute particles, removal by electrostatic precipitation has very many advantages in spite of the high initial cost. The method is very simple, consisting in passing the aerosol between two poles, one of which is charged to a potential of 40/60 kV. from a source of direct current while the other is earthed. In the space between the poles the gases become ionised and, in their passage through the gap to the earthed electrode, the ions pick up the suspended particles. On reaching the earthed (or collecting) electrode, the ions are discharged, the suspended particles being precipitated on the electrode.

Two Standard Designs

Two common designs of electrostatic precipitator are employed. From the constructional point of view the simplest type is the pipe treater, consisting of a number of steel pipes suspended vertically serving as flues for the gases. Hanging down the centre of each pipe is a weighted square-section steel wire which is charged to a high potential, the wire being connected normally to the negative pole of the D.C. supply. These treaters are generally updraughted, the gases entering at the foot from a common manifold. As the gases pass up the tubes ionisation takes place, the particles in suspension being carried to the collecting electrode by the ions. If the material in suspension is liquid, the particles coalesce and flow down the inside walls of the tubes. If solid dust particles are carried by the gases, the tubes must be hammered or rapped at frequent intervals. This treatment ensures that the particles are dislodged from the walls and that the conducting surface is kept free of deposited material. The discharge electrode must also be rapped. The tubes are therefore carried in a common header, hung on springs and made to vibrate by pneumatic or mechanical means. The metallic surface of the tube is maintained so that further ionisation and deposition may take place easily.

The other design, employed where conditions warrant it, comprises a series of horizontal flues in which earthed plates are hung vertically in pairs. Between each pair of plates is a thin wire of square cross-section charged to a high potential and connected to the negative pole of the D.C. supply. The plates comprising this plate-treater type of precipitator must be made of some completely conducting or semi-conducting material, the commonest being steel, or concrete in which steel rods or plates are embedded. One other variant of this design may be noted, viz., the "rod-curtain" type, in which the collecting electrodes are made up of a series of rods hung close together in line. This modification is useful in processes where high-temperature gases have to be treated, as the amount of distortion caused by the heat is very small. The gases may pass through the flues either horizontally or vertically. For the removal of dry dust the electrodes must be kept free of deposited material by periodic rapping or hammering just as in the previous type of precipitator.

The following are the advantages of electrostatic precipitation for the removal of suspended matter in gases :—

(a) Particles of solid or liquid or a mixture of both suspended in a gas may be recovered.
(b) A wide range of particle sizes may be treated by the process, *e.g.*, particles from 300 down to 0.1 μ may be easily recovered.
(c) In the range of particle size less than 15 μ the process is much more efficient than any of the dry mechanical types of dust catcher.
(d) The dust may be recovered dry.
(e) The electrical power used is very small, *e.g.*, less than 15 kWh. per million cu. ft. of gas treated.
(f) With suitably designed plant the draught loss through the precipitator may be made as small as 0.25 in. W.G.
(g) Gases at high temperatures may be satisfactorily cleaned without much loss of sensible heat, *e.g.*, with entering gases at 500° C. the temperature drop across the precipitator will be about 70° C.
(h) Maintenance and repair costs are low.
(i) The efficiency of the process may be varied within wide limits, dependent on the actual commercial conditions.

Against these undoubted advantages the only serious drawback to the installation of an electrostatic precipitation plant is the high capital cost. Where the recovered material is valuable in itself the saving experienced is frequently found to repay the initial cost several times over. In addition, the plant in which the precipitator is installed may be worked to greater capacity, as there is no necessity to be concerned about loss of valuable material in the escaping gases.

The installation of an electrostatic precipitation plant is specially advantageous where one or more of the following conditions obtain in chemical industry.

(a) Where the removal of a dust nuisance is important—in cement plants.
(b) Where valuable material is carried to waste by exit gases—in metal smelting and refining and in acid manufacture.
(c) Where the gas must be cleaned for subsequent use—in coke-oven gas and town gas.

Treatment of Cement Dusts

If the dust from cement plants, which are frequently built in rural areas, is not stripped from the exit gases from the kilns, it will cause destruction of vegetation and general loss of amenities. Electrostatic precipitation has found a particularly useful field of application in this industry. The plant, usually placed between the stack and the back end chamber on the kiln, may be either of the plate or tube type. In such tube-type plant, mild-steel pipes with discharge wires of similar material may be employed while in the plate type flue chambers may be built of mild steel or concrete, a row of earthed plates serving as collecting electrodes. A large cement kiln with a capacity of 1000 tons of clinker per day will produce exit gases at a temperature of 100/150° C. at the rate of quarter of a million cu. ft. per minute. A rod-curtain type of precipitator working under such conditions will remove up to 6 tons of dust per hour with dust collection efficiencies of over 94 per cent. The collected dust, composed of quantities of raw material and partly-calcined clinker, is not suitable for use in cement manufacture. If

conditions are suitable the dust may be returned to the kiln, otherwise it is dumped as valueless.

The largest application of electrostatic precipitation for the control of dust nuisance is in electric power stations burning pulverised fuel. Where power stations are situated in urban areas, tons of fly-ash must be removed from the boiler exit gases to comply with legal requirements and to prevent serious dust troubles. One of the largest electrostatic plants in this country is installed at a power station in the Midlands. The plant (manufactured by Lodge-Cottrell) consists of eight rod-curtain units provided with four banks of electrodes in series, each unit being equipped with inlet and outlet shut-off dampers. The gases from the boilers (amounting to 880,000 cu. ft. per minute at 300° F. at full boiler output) are passed through the eight treater units in parallel, up to 100 tons of dust being extracted daily. The dust particles are very small, almost 100 per cent. being less than 10μ. The guaranteed maximum dust content in the stack gases is 0.10 grains per cu. ft.

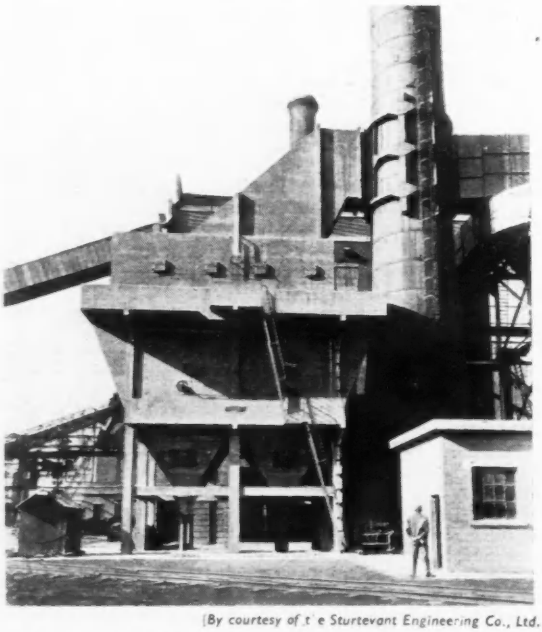
Sulphuric Acid Manufacture

Electrostatic precipitators have proved to be of particular utility in the removal of dust from sulphur dioxide gases produced from pyrites burners or Wedge roasters treating zinc concentrates. Complete dust removal is essential to prevent blocking up of the Glover tower. The development of rotary mechanical burners has made the problem of dust removal more acute. Pyrites oxidises most rapidly while in a state of suspension in air, consequently roasting takes place most efficiently while the pyrites is falling through the drop holes from one hearth to the next. A more rapid feed of charge and an increase in the area of the drop holes will therefore give more efficient roasting, leading simultaneously to a decided increase in the amount of dust formed. Effective dust removal from the burner gases is therefore necessary to maintain the optimum conditions in the Glover tower and to ensure maximum output from the burner.

Escaping from the burners at a temperature of 480/650° C. the sulphur dioxide gases carry a considerable quantity of sensible heat which should be conserved as far as possible to speed up reaction in the Glover tower. The uptake pipe from the burner feeds the gases to the inlet flue of a brick-lined precipitator, as shown in Fig. 2. The cleaned gas exhausted from the precipitator by a fan is then forced into the Glover tower. With an average dust content of from 3 to 6 grs. of solid per cu. ft. in the inlet gas, dust extraction efficiencies of over 95 per cent. may be easily obtained. As a certain degree of corrosion of the pipe occurs, carbon tubes have been suggested. The dust, recovered by hand or mechanically-operated rapping, amounts to about 2 or 3 per cent. of the weight of pyrites or zinc concentrates burned. Parrish[1] gives the following as a typical analysis of dust from Rio Tinto pyrites:

Pb	12.00 per cent.
As	1.70 per cent.
S	7.65 per cent.
Balance (mainly ferric oxide) ...	40/50 per cent.

A market for the dust would be found if the lead concentrate was over, say, 22 per cent. and Minerals Separators, Ltd., have carried out tests to devise a method of treating the dust by flotation concentration to increase the lead content to a readily marketable percentage.



(By courtesy of the Sturtevant Engineering Co., Ltd.

Fig. 1. An outdoor electrostatic precipitation plant at a power station

Cleaning of Blast-Furnace Gases

From the iron blast furnace large volumes of gas are given off, containing up to 30 per cent. or over of carbon monoxide. Roughly 50 per cent. of the coke in the initial charge finds its way into the gas as carbon monoxide. Obviously, such gas is a valuable fuel which may be employed for heating purposes in Cowper stoves, coke-ovens, open hearth steel furnaces and soaking pits; for steam raising in boilers; and for gas engine power in air compressors.

The growing use of a smaller number of Cowper stoves and a much closer packing of the chequer brickwork interiors calls for a very clean gas. The presence of even 0.1 gm. of solid per cu. m. leads in a very short time to blocking of the chequer passages and, if alkali fume exists in the gas, to serious corrosion of the brickwork and poor heat absorption and transmission. Frequently, blast furnaces and coke ovens are run in conjunction and, given a suitable commercial outlet for the rich coke-oven gas, the blast-furnace gas is used to heat the coke-ovens. Here again a high degree of cleanliness in the gas is essential to avoid clogging of burners and depositing of dust in the oven flues.

Similarly, though to a lesser degree, a good-quality clean gas is required when the blast furnace operates in conjunction with a steel plant, the blast-furnace gas being utilised in conjunction with coke-oven gas or producer gas to fire the open-hearth furnaces and soaking pits. Where the gas is exploded in the cylinder of a gas engine driving the compressor, it is patent that the gas supply should be carefully cleaned. The blast enters the furnaces at pressures from 6 to 15 in. W.G., so that the gases leaving the top of the furnace carry away entrained particles of iron ore, coke dust, and flux, dust values of 5 to 30 gm. per cu. m. being quite common. The gas must be cleaned to less than about 20 mgm. per cu. m., or 0.010 gr. per cu. ft. In a large plant producing enormous volumes of gas the amount of dust involved will be several hundreds of tons weekly.

Wet washing by disintegrators or other mechanical plant is frequently employed, but electrostatic cleaning has many advantages. Two combinations of treatment plant may be utilised. In the first the crude gas, passed through a suitably packed cooling tower, is irrigated with a flow of water sufficient to bring down the temperature to 25° C. The dust and water vapour are then removed in a wet-type electrostatic precipitator. In the second method the temperature of the gas is reduced to 80° C. by passing through an empty water-sprayed cooler. The greater part of the dust is then collected in a dry electrostatic cleaner. Finally, the gas is cooled to 25° C. by passage through a slate cooler and small traces of dust, water-vapour, and fog are removed in a wet-type electrostatic precipitator. The first combination has many advantages, but the large volumes of thin sludge from the coolers and scrubbers have to be treated in settling and thickening plant. Where water is scarce the clarified liquid must be recycled for further use. Such treatment yields a gas with less than 5 mgm. per cu. m. (or 0.002 gr. per cu. ft.). Where excessive cleaning is not required, the blast-furnace gases may be treated by a combination of settling chambers, cyclones, and dry electrostatic precipitators.

In view of the large volume of gas handled, electrostatic

precipitators working in conjunction with blast furnaces are usually characterised by a gas velocity so high that the flow of gas must be cut off when rapping of the electrodes is carried out. In processes where the velocity of the gases is not high enough to carry away the dislodged dust particles, rapping of the electrodes may be carried out continuously. In blast-furnace precipitators these conditions do not obtain, and to facilitate the sequence of operations necessary the precipitator is divided into a large number of sections. Each section contains several tubular collecting electrodes and is fitted with inlet and outlet valves and dampers, together with electric switches and independent rapping gear. The sections, arranged in rows, are served by a common camshaft, the cams on the common shaft engaging tappets which in turn operate the valves, dampers, and switches in the correct order. The common sequence of operations is: close inlet valve; shut off electric power; start up rapping gear; stop rapping gear; switch on electric power; open inlet valve.

Where a very clean gas is required, an additional step is involved. After the rapping operation is complete, a flow of scavenge gas (clean blast-furnace gas from the gasholder) sweeps through the tubes in the reverse direction to the normal flow, bearing away any dust particles which still remain in suspension in the tubes, and preventing such particles from being borne off by the first flow of cleaned gas. The use of an auxiliary fan is rarely necessary in a blast-furnace gas cleaning plant as adequate force is available in the blast pressure at the tuyeres. The normal blowing engines supplying the blast have such a high degree of efficiency that the additional 2½ to 3 in. W.G. pressure required to compensate for the draught loss through the precipitator may be obtained more easily and more economically than by the installation of boosting fans in the line.

Measurements of the actual dust content in a gas cleaned to 5/6 mgm. of solid per cu. m. is not easily arranged for routine work. Special filter-paper thimbles, operated in conjunction with a small motor-driven exhauster, pilot tube, and gas meter, may be of value in experimental work. A recording instrument known as a "kapnograph" has also been invented. A small quantity of the gas passed through a glass nozzle in the instrument impinges on a travelling chart, the intensity of the mark produced indicating the dust content. A very sensitive indicaion of the dust content is furnished by the colour of a pilot flame burning the cleaned gas: a clear pale blue flame will show a reddish-yellow tinge immediately the dust content of the gas rises above 5 or 6 mgm. per cu. m.

Coke-oven and town gas, even after scrubbing and cooling to 25/30° C., still contain small quantities of tar in the form of tar-fog or mist. Mechanical types of detarrers, e.g., Otto tar sprays, were employed to combat the tar-fog nuisance, but the replacement of these by electrostatic precipitators has been attended by very decided advantages.

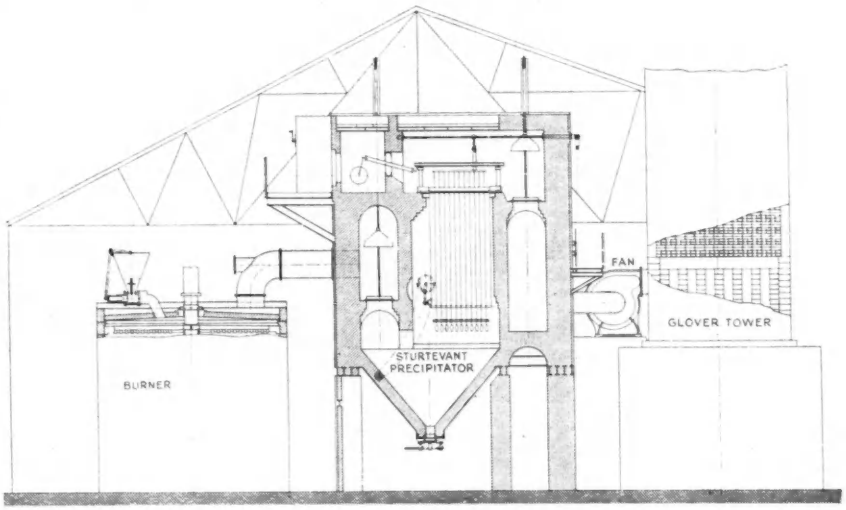


Fig. 2. Typical arrangement of precipitator in a sulphuric acid works using the chamber process

[By courtesy of the Sturtevant Engineering Co., Ltd.]

(a) The back pressure thrown by the plant is very low. Simon-Carves, Ltd., give values less than ¼ in. W.G. for some of their plants.
(b) The tar recovered is easily separated from the water, since it is not emulsified as in centrifugal washers.
(c) The saturator may be run for much longer periods without stopping for cleaning out.
(d) No thickening or wash-oil occurs in the stripping tower.
(e) The surface of the oxide in the purifiers remains free from tar for a much longer period, the boxes requiring much less opening and cleaning.
(f) The power consumption is low—less than 15 kWh. per million cu. ft. of gas at m.t.p.
(g) Maintenance and labour costs are low.

In this as in so many other applications of electrostatic

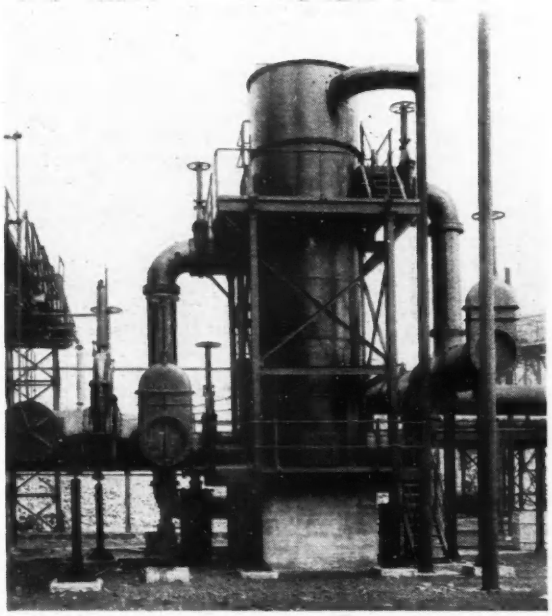


Fig. 3. Electrostatic precipitator working on coke-oven gas (Simon-Carves, Ltd.)

precipitators the high initial cost of the plant is the only disadvantage.

High efficiencies in tar-fog removal are easily attained, values of over 99 per cent. being quite normal. The following figures and tests are taken from the published records of the performances of electrostatic detarring plants manufactured by Simon-Carves, Ltd. On a coke-oven plant the replacement of Otto tar sprays by an electrostatic precipitator gave a precipitation efficiency of 99.74 per cent. and an increase in tar production of 200 tons per annum, the saving in wash oil being 2000 gallons per month. The power absorbed by the precipitator is 3.74 h.p. compared with 100 h.p. on the tar sprays. On a direct recovery plant the installation of an electrostatic precipitator in place of tar sprays reduced the insoluble matter content of the naphthalene recovered from the direct coolers from 2.35 per cent. to 0.376 per cent. The insoluble matter in the ammonium sulphate showed a reduction from 1.2 per cent. to 0.07 per cent.

The following figures illustrate the performance and efficiency percentages of electrostatic plants in an installation operating at normal load and at 30 per cent. overload.

TAR TESTS — TAR PRECIPITATOR OUTLET

Tar in Gas at Inlet (Calculated from Pitch make) = 800 grains/100 cu. ft.

Test No.	Time	Gas make per hour cu. ft. at 15° C. and 760 mm. Hg.	Gas make per hour cu. ft. at 76° C. and 760 mm. Hg.	Electrical Data: Volts	Amps.	M'amps.	H.T. Volts	Volume of gas used in test at 15° C. and 760 mm. Hg.	Grams tar Collected	Grains tar Collected	Grains tar per 100 cu. ft.	% Efficiency of Precipitator
	a.m.											
1	11.15	111,500	220,000	240	6.8	35	30,800	1.24	0.001	0.0154	1.25	99.84
2	11.30	118,000	232,500	240	6.8	35	30,800	1.10	0.0004	0.0062	0.56	99.91
	p.m.											
3	2.20	155,000	306,000	245	6.1	31	30,600	1.03	0.0031	0.0478	4.64	99.42
4	2.30	155,000	306,000	245	6.1	31	30,600	1.03	0.005	0.0772	7.50	99.06

Current consumption per million cu. ft. measured at 15° C. and 760 mm. Hg. pressure = 15 k.W.

These applications of electrostatic precipitators have been very trouble-free, the tar recovered running readily from the electrodes without any rapping device. Condensed naphthalene crystallising out on the electrodes may cause arcing and short-circuiting, but steaming of the plant at intervals will obviate this defect.

Removal and Recovery of Acids

In contact sulphuric acid plants the electrostatic precipitator has found a very useful field of work in removing the last traces of acid mist, arsenic, and volatile chlorides from the sulphur-dioxide gas stream. The plant is usually interposed between the coolers (where the temperature of the gas is reduced to 30/40° C.) and the drying towers. Collection efficiency of 99 to 100 per cent. is necessary at this stage, but lower values may be allowed if auxiliary coke filters are installed for the removal of final traces of acid mist. Corrosion-resistant materials, stainless steel, and acid-proof masonry must be employed in constructing these precipitators.

In processing petroleum oils for the production of refined petrol and allied products, large quantities of sulphuric acid are employed annually. Dilute solutions of sulphuric acid contaminated with carbonaceous materials accumulate as by-products. The recovery of such acid is required both for economic reasons and because of legal restrictions governing the conditions of disposal. The treatment usually adopted is to evaporate off excess moisture and burn out the combustible substances. During the treatment acid evaporates and may be recovered in electrostatic precipitators operating at temperatures sufficiently high to ensure that the water remains in the vapour phase, highly concentrated acid being recovered from the collecting electrodes.

The reduction of phosphate ores in electric or blast furnaces is to-day a very common procedure in the phosphate industry in the U.S.A. The gases from the furnace contain elementary phosphorus, phosphorus pentoxide, and carbon monoxide. From the furnaces the escaping gases, containing phosphorus vapour, phosphorus pentoxide, and carbon monoxide, are burned and the phosphorus oxides dissolved in a hydrator. The gases leaving the hydrator carry away quantities of phosphoric-acid mist, which may be recovered by electrostatic precipitators. At the T.V.A. phosphoric acid plant at Wilson Dam, Ala., the precipitators originally installed were constructed with lead tubes and silver wire discharge electrodes to resist the corrosive action of the acid. Later investigations have shown that acid-proof brick and stainless steel wires are equally effective, giving a 98 per cent. recovery of suspended acid particles from the gases.

Miscellaneous Applications

Suspensions of soda compounds in finely divided form are found in waste gases from soda and kraft pulp mills. The concentrations of these compounds are frequently high enough to make their recovery by electrostatic precipitation an economic proposition.

The extremely light weight and fluffy character of the particles of carbon black make their retention on a collecting electrode a matter of great difficulty. Only at very low gas velocities could the carbon black particles be retained on the electrodes, making the necessary equipment very large and expensive. The material which broke away from the electrodes was found to be composed of agglomerates with much greater settling properties. A novel system has been adopted, in which the electrostatic precipitator is employed to agglomerate the particles of carbon black. The gases escaping from the precipitator are then passed through cyclones in which the agglomerated particles are separated.

Electrostatic precipitators have not been used on an extensive scale for air-cleaning, eliminating smells, and rejuvenating vitiated air. One reason for this may be the production of ozone and nitrous oxides which always occurs in the usual type of precipitator. The corona discharge appears to be the cause of the formation of the gases. A special system of separate electrodes for charging and precipitation has been devised for air-cleaning purposes. By this means the charging operation may be controlled independently, the charge being reduced to the minimum necessary to ionise the particles.

The author wishes to acknowledge his indebtedness to Simon-Carves, Ltd., and the Sturtevant Eng. Co., Ltd., who have supplied technical data relating to the plants they manufacture together with a selection of photographs. Special acknowledgment is made on each photograph used as an illustration.

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2 O. U. LAWRENCE, "Modern Precipitator Practice." *Chem. Met. Eng.*, 1938, *45*, p. 279.
3 H. J. BUSH, "Some Applications of Electrical Precipitation to Industrial Effluent Gases." *Trans. Inst. Chem. Eng.*, 1938.
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5 CURTIS, MILLER and NEWTON, "Process Developments at T.V.A. Phosphoric Acid Plant." *Chem. Met. Eng.*, 1938, *45*, pp. 116, 193.
6 D. W. RUDORFF, "The Design and Operation of Flue Dust Collectors." *Engineering and Boiler House Review*, May, 1937.

LETTERS TO THE EDITOR

Evaporation of Milk

SIR,—Your issue of March 7 contains, on page 121, an interesting article on the evaporation of milk, in which the author appears to imply that the inclined rapid-circulation type of evaporator is the last word in plant of this nature.

While, of course, we are aware that the article is intended to deal rather with the process of evaporation than with the plant used for this operation, we feel justified in calling the attention of your readers to our patent multi-circulation evaporator. This combines the advantages of continuous concentration with that of concentration at a low temperature, and, in addition, has all the advantages of our well-known standard type climbing-film evaporator.

A very interesting feature of this evaporator is that it causes very much less scaling than with other makes. For example, whereas it is customary when dealing with milk with most other evaporators to clean out the plant at least every shift, and sometimes even more frequently, we have many reports of our evaporator running satisfactorily for two shifts, and even longer, without cleaning. This clearly substantiates our claim that we can concentrate milk without damage by overheating, thereby obtaining the highest possible quality in the finished product.

We have made a number of installations with this type of evaporator, both for milk and for sensitive products in general, and we believe we are justified in saying that these have, in every case, proved satisfactory. The accompanying illustrations show (Fig. 1) a photograph and (Fig. 2) a typical sectional arrangement of a multi-circulation evaporator.—Yours faithfully,

KESTNER EVAPORATOR & ENGINEERING CO., LTD.
BRIAN M. REAVELL,
Joint Managing Director.

London, S.W.1.
March 18, 1942.

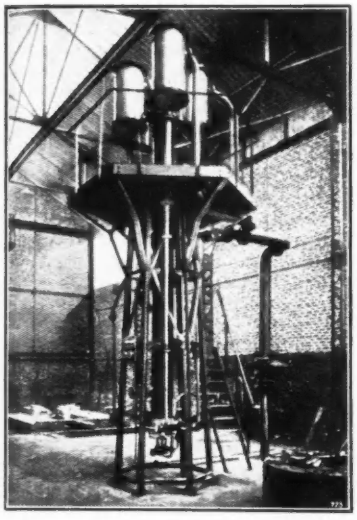

Fig. 1. Triple-circulation evaporator, with three calandrias

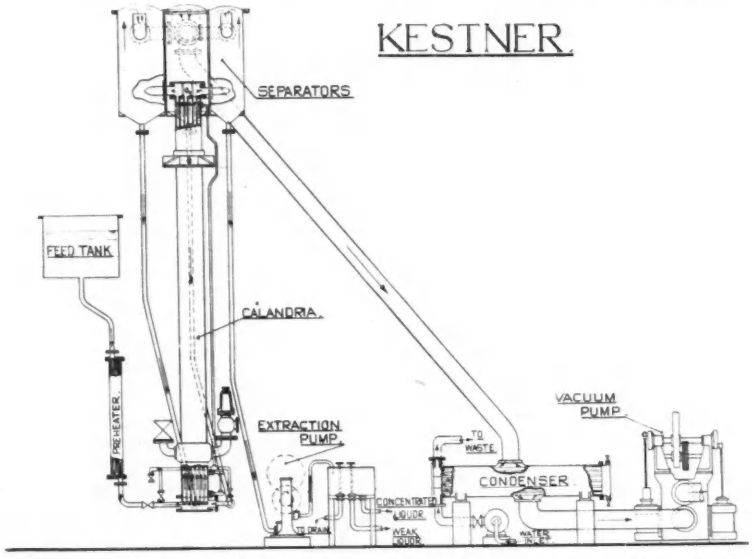

Fig. 2. Sectional arrangement of a multi-circulation evaporator for a design with two or more calandrias

Fire Caused by Steam-Heated Pipes

SIR,—A few weeks ago I had to visit a mirror factory as a consultant. When the managing director and I entered the silvering shop, the room was filled with steam like a wash-house. Asked what the matter was, the director explained that they silvered their glasses on steam-heated tables and that the steam was not turned off in time. Therefore the water in the heating-basin of one table, through which the steam pipes ran, was brought to the boil and had caused the steam in the shop. The steam was then turned off and after a few minutes the room became clear, except that steam still appeared to evolve from the table. We paid no attention to the few clouds until a strange smell made us suspicious. It was not steam emanating from the table, but fumes. We examined the table carefully to find out what was happening. The table was covered with slates which, in their turn, were overlaid with a cloth, damp from the silvering solution and rinsing water, but originally impregnated with shellac varnish. Under the slates was a basin with warm water, and the steam pipes. The slates were supported by wooden cross-bars. The steam-pipes touched the wood in some places.

We had some difficulty in detecting what was burning. Nothing was visible at first, as the cloth covered the sides, overlapping the basin, and was stiff from age. When we had removed the cloth we saw that a wooden cross-bar underneath the slate about 2 feet away from the edge was on fire. It was difficult to see and impossible to reach without using a special arrangement. The slate above it was intact; the cloth unimpaired and wet. One of the steam pipes, bending round, touched the wood outside the water of the basin.

We splashed some water against the smouldering wood, and the fumes disappeared. After half an hour or so, when we returned to the silvering shop, the table was on fire again. This time we used a can with a long narrow spout and extinguished the glowing wood thoroughly.

The director told me that this table and others had been in use for more than 35 years and that such an incident had never before occurred. The steam used had a pressure of about 50 lb./sq. in., or nearly 4 atm. at the boiler. At the table the pressure was certainly much smaller; but even if it had been the same, the temperature could not have been more than about 145° C. or 293° F. How is it possible for wood to catch fire at such a low temperature? Could the unused silver solution containing ammonium nitrate, which might have leaked through and impregnated the wood, be considered responsible? It would be of great interest if similar accidents could be reported. It should be borne in mind that if a claim against an insurance company were to result from such a source of fire the claim would be regarded as more than dubious.—Yours faithfully,

BRUNO SCHWEIG, Ph.D.

Reading.
March 20, 1942.

[Though in the instance reported above no serious harm resulted, it is clear that fire hazard existed. Reports of similar occurrences would be welcome, as they should throw light on what may well be a serious problem.—ED.]

Patent Law

Some Defects and Peculiarities

ENGLISH Patent Law contains a number of serious defects and opens the way to certain grave abuses. The most important of these were discussed by Dr. J. G. Fife in a paper read before the British Association of Chemists in London on Monday night, in which he dealt with Patent Law from every useful angle. First among the defects is the fact that a large proportion of patents granted by the British Patent Office are invalid for one reason or another. Dr. Fife estimates the proportion to be as high as 80 per cent., while over the last ten years (1932-41) the percentage of invalid patents among those actually considered by the Courts was 63.25. In 1940 and 1941 *all* patents whose validity came into question were held to be invalid.

Restricted Power of Examiners

The main reason for this is the restricted power of the examiners, who are not permitted to take into consideration the two most important grounds of invalidity: lack of subject-matter and lack of utility. While Dr. Fife, like most of us, is reluctant to place more power in the hands of officials, he considers that in this instance wider powers might well be given to examiners, always provided that there was an adequate right of appeal. This could, of course, be to the existing Patents Appeal Tribunal, which has worked well for ten years.

Such a procedure would allow a large number of invalid patents to be strangled at birth and would preclude the setting up, by large and powerful concerns, of a network of interlocking patents, most of which are undoubtedly invalid and have been described by Dr. Levinstein as "a mass of bogus, bluff, blocking paper patents, valueless, but with a menace grinning through the paper mask." The removal of this kind of patent would be an immense advantage, not merely to the independent inventor and small firm, but also to the large companies, who would be relieved of the necessity of competing in the build-up of unnecessary patents which is now forced upon them.

This "patent position," as the network of patents is called, has been used by large concerns as a weapon to prevent competition from smaller firms in particular fields. The threat of an infringement action is usually enough to act as a deterrent to any small firm or independent worker, as the costs involved when an infringement action is brought are invariably large, even if it is unsuccessful.

This leads to the discussion of another abuse: the extremely high cost of patent litigation, owing to the necessity of employing counsel, solicitors, and patent agents, and of protracted proceedings made obligatory by the need of explaining technical points to a judge who is unversed in the special scientific matters involved. A suggested solution of the difficulty would be the establishment of a special tribunal armed with technical knowledge, on the principle of the Railway Rates Tribunal, with permission, when occasion demands, to apply to the Court of Appeal.

Relation of Employer to Employee

Queries are often raised as to the relation between an employee responsible for a patent and his employer, particularly if the employee quits the employer's service. Dr. Fife dealt fully and clearly with this vexed question. The matter is, of course, a question of Common Law rather than Patent Law, and, while there can be no hard and fast universal principles laid down, the best course is for every employer and employee to have a proper service agreement defining their several rights. Care must be taken not to frame an agreement that might be held to be in restraint of trade and against public policy

Generally speaking, if an employee occupies a position of responsibility in a concern, and if the invention concerned in the patent has to do with the employer's business, then the patentee-employee is regarded as holding the invention in trust for his employer. An employee who is likely to be responsible for inventions of profit, will (if his employer is a sensible man) have been receiving adequate remuneration based on the likelihood that he will produce such inventions, and in return for this the employer is entitled to the benefit of an invention devised in his time, even if the employee has since left his service. At the same time the employee is entitled to have his name mentioned in the application.

Scientists have often been justifiably annoyed by finding that patents, taking advantage of their published researches, but containing some minor alteration, have been applied for in many countries by some large company or another. The only legal remedy here is for the original researcher to file an opposition to the application or to file an application for revocation within one year of the actual date of the patent. Here, again, the question of expense acts as a deterrent to action, but, as Dr. Fife points out, such patents will in general be held invalid on the ground of lack of subject-matter.

Points about Chemical Patents

Points of particular interest to chemists and chemical engineers in connection with patent specifications are that an examiner may call for typical samples and specimens to be filed in respect of a chemical invention. If the applicant claims the treatment of a large class of chemical substances, and is unable to file samples from a judicious selection made by the examiner from this class, then he is obliged to reduce the scope of his claims or have his application refused. Further, in the case of patents dealing with food or drugs, the Comptroller can grant licences for the use of such patents. This provision was made at the instance of the medical profession, whose official view is that patents should not be granted in respect of inventions affecting the alleviation of human suffering.

The question of "Selection Patents" is likewise of special interest to chemical inventors. This term is usually applied to a patent in which the invention consists of the selection of some particular components or conditions from among those already known. The classical decision of Mr. Justice Maugham (now Lord Maugham) in this matter was briefly as follows: (a) There must be some substantial advantage to be secured by the use of the selected members, or some substantial disadvantage must be avoided; (b) the whole of the selected members must possess the advantage; and (c) the selection must be in respect of a quality of a substantial character which can fairly be said to be peculiar to the selected group. Unless a selection patent fulfils these three conditions it will be held invalid by the Courts.

CASEIN AID TO DRILLING MUDS

Possibilities of utilising casein to prevent the caving in of the bore holes during drilling for oil is now being examined by the Texas Company of New York. In drilling in some localities there has been a tendency for shale to slide into the bore hole. This is believed to be caused by water which oozes through the shale strata. Such a tendency to "heave" can be overcome by circulating through the bore hole a drilling mud in which is dispersed casein. After the treated mud has thoroughly permeated the wall of shale it is withdrawn.

A second mud containing a hardening agent for the casein, *e.g.*, formaldehyde, is next circulated through the bore hole. This hardens the casein dispersed through the shale so that it forms a seal or waterproof "filter-cake" which keeps the heave-causing water back. So strong is the casein seal that it will withstand a water-pressure of 5000 lb./sq. in.

Thermal Conductivity

Researches in the National Physical Laboratory

A PAPER on the Thermal Conductivity of some Industrial Materials was presented to the Institute of Fuel on Thursday last week by Dr. Ezer Griffiths, F.R.S., Dr. R. W. Powell, and Mr. M. J. Hickman, of the Physics Department, National Physical Laboratory. The paper included a description of the various types of apparatus in the Laboratory devised for high-temperature thermal conductivity determinations. Data were given for refractories, insulating bricks, granular and fibrous materials, mica-carbon, graphites, and metals. The packing under load of compressible materials was discussed and an account given of experiments to determine the settlement of slag wool in a cavity wall. A marked decrease in the thermal conductivity of certain phlogopite micas on heating to about 200° C. led to an X-ray examination which confirmed that the originally perfect plane crystals had disintegrated into a number of tilted elements. Vermiculite, a special variety of exfoliated mica, used in the form of small flakes as a high-temperature heat insulator, shows this effect to a marked degree.

The effect of impurities on the conductivity of iron was shown to be less at high than at normal temperatures. In general, the conductivity of an alloy is less than that of the main constituent element. Even small impurities sometimes cause a marked reduction. In addition, the values at a particular temperature lay reasonably well on a smooth curve when the thermal conductivity was plotted against the total equivalent carbon content of the added elements.

The thermal conductivity of carbon was noted as being much less than that of metals, while one of the natural (Ceylon) graphites studied had a conductivity exceeding that of copper at normal temperatures. Its conductivity, however, decreased very rapidly with increase of temperature, so that by 300° C. its conductivity had fallen so low as to become comparable with that of one of the poorer aluminium alloys. Other natural graphites were of lower conductivity, and two samples of Acheson graphite started with values of 0.4 and 0.29 at 0° C., which fell to 0.128 and 0.188, respectively, at 1000° C.

The possibility of deriving the thermal conductivity of a metal from a knowledge of its electrical resistivity was considered. Equations to represent the relationship $K\rho/T$ = constant for the four principal groups of alloys have been found, where K is the thermal conductivity, ρ the electrical resistance, and T the absolute temperature, as follows:

Copper alloys	$K = 0.571 \times 10^{-8}\ T/\rho + 0.018$
Aluminium alloys	$K = 0.502 \times 10^{-8}\ T/\rho + 0.03$
Magnesium alloys	$K = 0.516 \times 10^{-8}\ T/\rho + 0.022$
Irons and steels	$K = 0.625 \times 10^{-8}\ T/\rho + 0.006$

In general the experimental points lie within 10 per cent. of the line, but there are some exceptions. Among these it may be mentioned that the presence of high percentages of silicon in aluminium alloys leads to unduly high values for the thermal conductivity. Cast irons which have been heat-treated and contain free graphite also give much higher thermal conductivities than their electrical resistivities would lead one to expect. With these reservations the foregoing equations offer a useful means of forming an estimate of thermal conductivity from a measurement of electrical resistivity.

Interesting figures of the import trade of Canada for 1941 have been issued by the Dominion Bureau of Statistics, revealing that the total value of imports for 1941 rose to $1,448,665,000, as compared with the 1940 total of $1,081,951,000. Significant increases were shown by the imports from Brazil (figures in thousand dollars), which rose from 6243 to 19,444, from Colombia (9851 to 12,913), from Cuba (1431 to 4330), from Venezuela (3118 to 6527), and from New Zealand (5378 to 13,552). An exception to the general rise in South American imports was afforded by Argentina, where a slight decrease (6542 to 4764) was in evidence, though the December figures revealed a tendency to counter this. Imports from the U.K. remained practically stationary at 136,282, compared with 136,510 in 1940.

Chemicals in South Africa

Sodium Silicate and Tung Oil Prospects

A FACTORY has been established in Johannesburg for the production of sodium silicate, and the Department of Commerce and Industries are advised that a second factory, established in Durban, has also come into operation. In both cases South African raw materials are to be used. Imports of sodium silicate into the Union during 1939 amounted to 4,358,105 lb. According to a report by the Indian Government Trade Commissioner in East Africa, a few consignments of sodium silicate of Indian manufacture have been imported by soap manufacturers. Statistics given in the official journal of the Department of Commerce and Industries indicate the possible scope of the East African market for the new South African industry. The total imports of sodium silicate by Kenya and Tanganyika in 1939 amounted in value to £1,274, of which material valued at £890 came from the United Kingdom and imports from France totalled £349. Tanganyika imports during the same year were valued at £990, with British material amounting to £762. In 1938 a certain amount of Japanese sodium silicate was imported into East Africa.

Another new South African interest is the manufacture of whiting, which is being undertaken by an industrial concern in Potchefstroom. The product is graded according to fineness, the first grade being supplied to the paint and rubber trade, while the second grade is used by certain industries which do not require a very fine product. The existing plant is being extended to bring the total output up to 400 pounds monthly.

Research on Desiccated Citrus

According to official statements, "desiccated citrus," or "powdered oranges," capable of retaining the valuable vitamin-C content in any climate, may possibly become of industrial significance in South Africa. The problem of shipping would largely be overcome by the production of a satisfactory powder, since the bulk required for fresh fruit would be reduced by more than ten times. This is the problem on which South African scientists are now engaged, and, according to the Superintendent of the Low Temperature Research Laboratories, there are already indications that a solution may be found.

Tung oil is stated to be on the way to becoming the basis of a new South African industry. Cultivation of the tree from which the oil is produced has passed the experimental stage, and the Union now has about 60,000 tung trees, according to the official estimate. Tung seed was imported into South Africa in 1923, when the Department of Agriculture began its experiments. In 1928 more seed was imported and trial plantings established in the Eastern Transvaal, Natal, Swaziland, and other areas. Steady importations followed and there are now many plantings of more than 2000 trees each. Because of the high prices quoted for the oil, many farmers have become interested in the trees. The sub-tropical horticultural research station at Nelspruit has interested itself in tung nut research not because of the present high prices, but mainly because it is believed that certain areas, chiefly in the Transvaal lowveld and Natal, may prove extremely suitable for the commercial production of this crop. Individual six-year-old trees in South Africa have been known to produce as much as 40 to 45 lb. of seed, but such yields are exceptional. The research station at Nelspruit in a recent estimate gave the average yield per acre per annum, based on a 20-year period, at 581 lb. (70 trees per acre). On a basis of £30 a ton the profit per acre would be £3 14s. or £7 8s. per morgen.

Petrol rationing may lead to an increase of South African power alcohol production. At Germiston and in Natal private companies produce annually some 3,000,000 gallons of alcohol from maize and sugar cane. A Government committee has recommended a survey of coal deposits to determine the supplies available for converting into oil and petrol by hydrogenation. Tests on a fairly large scale have been recommended.

Personal Notes

DR. E. B. HUGHES, D.Sc., F.I.C., has, by a special resolution of the Society, been elected to continue in office as President of the Society of Public Analysts and Other Analytical Chemists for a further period of one year beyond the normal period of two years, which he has already served.

DR. A. PARKER, vice-president of the Institution of Chemical Engineers, has been awarded the Osborne Reynolds Medal, for meritorious services to the Institution. The Moulton Medal was awarded to MR. P. PARRISH, M.Inst. Chem.E., for the paper on "Modern Developments in the Design of Plant for the Concentration of Sulphuric Acid." MR. E. W. PATES has been presented with the William Macnab Medal, for the best set of answers in the Associate-Membership examination of 1941.

PROFESSOR T. P. HILDITCH, who holds the chair of Industrial Chemistry at Liverpool, PROFESSOR D. M. NEWITT, of the Department of Chemical Technology, Imperial College, London, and PROFESSOR A. R. TODD, head of the Chemistry Department, Manchester University, have been elected to the Fellowship of the Royal Society. Other new F.R.S.'s include the following: J. H. BURN, Professor of Pharmacology, Oxford; M. DIXON, Lecturer in Biochemistry, Cambridge; E. C. DODDS, Professor of Biochemistry, Middlesex Hospital Medical School; C. C. PATERSON, Director of the Research Laboratories, General Electric Company, Wembley; J. K. ROBERTS, Assistant-Director of Research, Colloid Science Laboratory, Cambridge.

Obituary

MR. JAMES PERCY STONIER, who died on 1 March 24 at Menston-in-Wharfedale, Yorkshire, aged 70, had served with I.C.I., Ltd., and its forerunners at Leeds and Bradford as a statistical sales manager. His service began in 1886 and ended in 1930, when he retired with a pension.

MR. WALTER HARDING JONES, secretary and director of The Press at Coombelands, Ltd. (printers of THE CHEMICAL AGE) died at Guildford on March 23. He had been a director of the Press since 1919, and throughout his service he was a good friend and wise adviser to the editorial staffs whose press-day duties were lightened by his natural instinct for combining business and pleasure to the benefit of both.

New Control Orders

Drying Oils

BY the Control of Drying Oils (No. 1) Order, 1942 (S.R. & O. 1942, No. 484), the Minister of Supply prohibits the buying and selling, except under licence, of any of the following oils so long as they are not mixed with, or an ingredient in, any substance which is not solely one or more of those oils: tung oil (china wood oil), oiticica oil, stillingia oil, any drying oil made from castor oil, and any thickened or mixed oil of which one or more of the above oils is an ingredient. The Order came into force on March 23.

Bromides and Bromates

The Safeguarding of Industries (Exemption) No. 2 Order (S.R. & O. No. 363, 1942) rules that such calcium bromide as was not entered under the Customs Acts before March 11 or was not removed from a bonded warehouse before that date, shall be exempt from the duty imposed by the Safeguarding of Industries Act until June 30, 1942. S.R. & O. No. 364, 1942, provides that zinc and calcium bromides and certain mixtures of calcium bromide and bromate such as are produced by the neutralisation of bromine by lime shall be exempted from the general *ad valorem* duty imposed by the Import Duties Act, 1932.

Tins, Cans, etc.

The Control of Tins, Cans, Kegs, Drums, and Packaging Pails (No. 6) Order, 1942 (S.R. and O. 1942, No. 467), varies the No. 5 Order by prohibiting the use on or after April 15, except under licence from the Minister of Supply, of tinplate, tin sheet, terne plate, terne sheet, lead-coated sheet, or galvanised sheet in any controlled metal container, metal holder, or crown cork, unless such article had been partially fabricated before the above date.

Chemical Matters in Parliament

Re-Use of Lubricating Oil

IN the House of Commons last week, Mr. Silkin asked the Secretary for Petroleum whether, in view of the need for conserving oil, satisfactory steps were being taken to reclaim, to the maximum extent, lubricating oil. In reply, Mr. Lloyd referred Mr. Silkin to the reply which he had made to Sir I. Albery on January 27 (*see* THE CHEMICAL AGE for February 7) and stated that since that date further arrangements had been made for the collection of waste lubricating oil from garages with a view to its being reclaimed to the maximum extent possible.

The Fischer-Tropsch Process

Mr. Ivor Thomas asked the Secretary for Mines whether, in order to increase the supply of home-produced motor fuel and to develop alternative sources for fats, he would consider the establishment in this country of a plant for the synthesis of oil from water-gas.

Mr. Grenfell replied that the possibility of erecting plants to work the Fischer-Tropsch process, to which he assumed the question referred, was carefully examined by a committee under the chairmanship of Sir William Jowitt, early in 1940. Their conclusions were now being carefully considered, together with all other possible means of reducing the use of imported oil.

To a suggestion by Mr. Shinwell that, in considering the committee's conclusions, considerable delay had occurred, Mr. Grenfell replied that it must be realised that the report could only be of use when all the essentials in the report were available. For this purpose four or five tons of coal were required to make one ton of oil.

In reply to a question by Mr. A. Edwards as to whether the best use was being made of creosote oil, Mr. Grenfell said that he hoped so.

Atmospheric Pollution

Slight Increase in the Year

THE annual report on the Investigation of Atmospheric Pollution carried out by the D.S.I.R. for the year 1940-41 will not be published in the usual way, but the summary which takes its place maintains the general record of observations made.

Observations on the deposit gauge over the whole country indicate an improvement at the most highly polluted places, but a general tendency towards increased pollution elsewhere, due no doubt to the greatly increased industrial activity. They lead also to the conclusion that the steady, if slight, improvement in the state of the atmosphere during the few years immediately preceding the war was not maintained during the year 1940-1.

Complete measurements of sulphur dioxide by the volumetric method have been made at London (Beckton and Crossness), Salford, Sheffield, and Newcastle. From these measurements there appears to be a slight increase in the average concentration of sulphur over last year. Complete sulphur measurements by the lead-peroxide method were made at 38 places. Comparison of the results for summer and winter periods 1939-40 and 1940-41 show that there was considerably less sulphur pollution during the summer of 1940, while there was no significant difference between the two winter periods.

The general impression obtained from a study of the year's observations is that the decrease of atmospheric pollution during the past few years has now been reversed. Considering the great increase in industrial activity during the period, however, the increase does not appear likely to be out of proportion to the amount of coal burnt.

General News—From Week to Week

Donations totalling over £952 and covering charitable institutions in Yorkshire, Lancashire, and London, have been made by the Bradford Dyers' Association for 1942.

Middlesbrough Town Council has been recommended to apply to the Board of Trade for exemption from gas supply restrictions as the town's gas is wholly derived from surplus coke oven gas. A similar concession was granted in the last war.

It was announced in the House of Commons last week, by a representative of the Ministry of Supply, that, in addition to the negotiations between the Ministry and three tin mines at present in production in Cornwall, exploratory work was being undertaken at properties not yet producing.

The Board of Trade announces that the list of specified persons, which is at present embodied in seven Orders, is being published in a new consolidating Order, the Trading with the Enemy (Specified Persons) (Amendment) (No. 4) Order, 1942 (S. R. & O. 1942, No. 373, price 3s. 6d.).

Supplies of tartaric acid and cream of tartar are limited, according to a notice issued by the Ministry of Food, and when the present small stocks are exhausted, further quantities may not be available for the baking industry. Pyro cream powder and acid calcium phosphate are available and are suitable alternatives. Citric acid is available to meet the normal demand.

In reply to a question by Viscountess Astor in the House of Commons last week, Mr. Dalton stated that her suggestion that shaving soaps and creams should be brought within the scope of the Limitation of Supplies Orders had been taken note of, in view of the fact that their manufacture involved the use of glycerine, oil, and metal tubes.

Petroleum jelly for toilet use is stated, in a supplement to Customs and Excise Notice No. 78, to be chargeable with Purchase Tax at 33⅓ per cent., under Class 18. All other petroleum jelly (including B.P. and B.P.C. standards) is chargeable at 16⅔ per cent., under Class 19, unless it is supplied in bulk in containers of 7 lb. or more and is not put up as a medicinal preparation.

Enforcement Inspectors employed by the Ministry of Food are now permitted to enter any premises in which they have reasonable cause to believe that food is being manufactured, prepared, stored, or exposed for sale, and to take samples of such food for the purpose of ensuring compliance with any of the Ministry's Orders or of facilitating the introduction or operation of any scheme of control.

Employers of skilled scientific-instrument makers, sheet-metal workers, and metal machinists (among other trades) who are now in the Forces are requested to send particulars of such men to the Secretary, Committee on Skilled Men in the Services, Queen Anne's Chambers, London, S.W.1. Such information should include the man's Service number, his rank, full name, the Service and unit or Corps in which he is serving, and his normal civilian occupation. If the Service trade in which he is mustered is known this should also be stated, together with the extent to which he is now employed in his Service trade. Particulars of semi-skilled men are not required.

Foreign News

Control of the distribution of industrial molasses has been taken over by the Chemicals Controller in Canada.

A new company, to be known as the Hungarian Plastics and Chemical Works Co., Ltd., has been formed in Hungary, with a capital of two million pengo, for the production of synthetic resins, synthetic rubber, synthetic leather and plastics.

Large manganese deposits in Western areas of the United States, which were once thought to be valueless, may now be made to yield 100,000 tons of high-grade ore annually, as a result of a new simple chemical process, according to a San Francisco report. It is understood that negotiations with the government are now complete for the erection of a $4,500,000 mill near Las Vegas, where the first big deposit is to be worked, and the mill will be operating this year.

The Chilean Government is reported to have concluded an agreement with the Metal Reserve Company of the U.S.A., whereby the latter agrees to take delivery of the entire Chilean production of copper, mercury, manganese, etc.

Research workers of the Northern Regional Research Laboratory of the U.S. Department of Agriculture, Peoria, Ill., have developed an efficient and cheap means of producing from corn sugar an intermediate product, 5-ketogluconic acid, from which tartaric acid may be synthesised. The method worked out on laboratory scale will be tested in pilot plant equipment. The U.S.A. has a plentiful supply of corn sugar or glucose.

China wood oil, one of the chief exports of China in normal times, is being popularised for domestic consumption. It is largely replacing kerosene as a lighting medium, and it is stated that eleven factories near Chungking are producing liquid fuel from the oil. It is also claimed that a wood-oil mixture is of great service in surfacing roads. Oilcloth and lacquer polish are two further uses for this versatile Chinese commodity.

Manganese ore (35 per cent. or more manganese) shipped from U.S. mines was estimated at 76,000 long tons in 1941, according to the Bureau of Mines, compared with a total of 40,123 tons in 1940. Shipments of ferruginous ore (10 to 35 per cent. manganese) rose from 320,000 to 459,000 tons, and manganiferous iron ore (5 to 10 per cent. manganese) from 816,540 tons to 820,000.

I.G. Farbenindustrie has been authorised to raise its ordinary capital from 760 to 900 million marks (there are also 40 million marks of preference shares). For the time being, 48½ million marks of new shares only have been issued of which 12¼ million marks have been used in connection with the formation of "Francolor." The remaining new shares were to be used for financial transactions.

Forthcoming Events

The extraordinary general meeting of the **Society of Public Analysts and other Analytical Chemists** will be held at 5 p.m., on **April 1,** at the Chemical Society's rooms, Burlington House, W.1. This will be followed by an ordinary meeting at which the following papers will be read: "The Biological Estimation of Vitamin P Activity," by A. L. Bacharach and M. E. Coates; "A New Absorptiometric Method for the Estimation of Blood Sugar," by R. F. Milton; and "A Modified Hilger Vitameter 'A'" by F. J. Taylor.

A meeting of the Birmingham Section of the **Electrodepositors' Technical Society** will be held at 6 p.m., on **April 7,** at the James Watt Memorial Institute, Great Charles Street, when W. F. Jesson will present a paper on "Solvent Economy on Trichlorethylene in Degreasing Paints."

The annual meeting of the **Food Group, Society of Chemical Industry,** will take place at 2.15 p.m., on **April 8,** at the Chemical Society's rooms, Burlington House, London, W.1. The meeting will be followed by an address from Dr. J. Hammond, F.R.S., on "Animal Production in the Post-War World."

There will be a meeting of the **Electrodepositors' Technical Society** at the Northampton Institute, St. John Street, E.C.1, at 5.30 p.m., on **April 13,** when a paper on "Experiences in Alkaline Zinc Plating" will be read by J. S. Jones and P. M. Walker.

A joint meeting of the **Chemical Engineering Group** (Society of Chemical Industry) and the **Institution of Chemical Engineers** will be held on **April 14,** at 2.30 p.m., in the rooms of the Geological Society, Burlington House, W.1, when a discussion on "The Development of New Chemical Processes" will be opened by H. M. Cremer, M.Sc., F.I.C., M.I.Chem.E., chairman of the Chemical Engineering Group.

The Chemical Society announces that the Sir Joseph J. Thomson Memorial Lecture will be given by the Right Hon. Lord Rayleigh, F.R.S., in the Lecture Theatre of the Royal Institution, at 4.30 p.m., on **April 16.**

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

LACTOCOL, LTD., Epsom Downs, glue manufacturers. (M., 28/3/42.) March 5, debenture to Barclays Bank, Ltd., securing all moneys due or to become due to the bank; general charge. *Nil. Dec. 8, 1941.

KINGSCLIFFE SUPER-REFRACTORIES, LTD., Sheffield. (M., 28/3/42.) March 6, £3000 debenture to Branch Nominees, Ltd., general charge. *£2106. June 7, 1941.

THERMO PLASTICS, LTD. (formerly Thermo Plastic Products, Ltd.), Dunstable. (M., 28/3/42.) March 4, mortgage to Midland Bank, Ltd., securing all moneys due or to become due to the bank, charged on contract moneys. *Nil. December 31, 1940.

Satisfaction

METAL PRODUCTS (TREFOREST), LTD., Pontypridd (M.S., 28/3/42.) Satisfaction February 11. £1000, registered March 18, 1940.

Order Made on Application for Discharge

BEUGGER, KNUD JOHN ALWIN, chemical engineer, The Red House, Loom Lane, Radlett, Herts. (O.M.A.D., 28/3/42.) Discharge granted subject to debtor's consent to judgment for £50, which was obtained.

Chemical and Allied Stocks and Shares

ATTENTION in the City has centred on London's Warships Week, consequently very little business was transacted in the stock and share markets. Nevertheless, the success of Warships Week tended to have a helpful influence on market sentiment. British Funds were inclined to improve, and, in the absence of selling, a steady undertone has been maintained in industrial securities. Although the disposition to await the Budget had a restraining influence in some directions, there was a firmer trend in shares of companies engaged in vital war work, which tended to respond to hopes of some modification of E.P.T. directed towards making the incidence of that tax less inequitable.

Imperial Chemical remained steady, awaiting the forthcoming preliminary statement for the past year's working, and at 32s. 6d. were little changed on balance, as were the 7 per cent. preference units at 35s. 7½d. B. Laporte remained at 63s. 9d., and British Drug Houses held their recent rise to 26s. 3d. On the other hand, Lever and Unilever eased to 25s. 6d., although the 8 per cent. preference units made the better price of 28s. Business at 8s. 3d. was recorded in Lawes Chemical shares at one time, while Morgan Crucible issues remained firmly held, and the 5½ per cent. first preference were 25s. 7½d. The raising of the dividend of Lacrinoid Products from 7 to 9 per cent. tended to draw rather more attention to shares of companies with plastics and allied interests. The 2s. shares of the last-named company were around 2s. 3d., while British Industrial Plastics 2s. shares were 3s. 6d. and Erinoid ordinary around 7s. 3d.

Associated Cement at 43s. 1½d. have again moved lower in advance of the dividend announcements, and British Plaster Board were 21s., as compared with 21s. 6d. a week ago. On the other hand, British Aluminium were steady at 43s. xd., aided by satisfaction with the results, while British Oxygen were firm at 67s. 9d., awaiting the dividend declaration. Fison Packard were slightly lower at 39s., but Borax Consolidated improved to 30s. 6d., having remained under the influence of the results and the chairman's annual review. Market talk of the possibility that the Budget may bring some modification of E.P.T. assisted iron and steel issues, and Baldwins, Stewarts and Lloyds, and United Steel were inclined to improve, but movements did not exceed more than a few pence. Tube Investments were 81s. 6d. Allied Ironfounders had a steady appearance at 23s. 9d., but Babcock and Wilcox moved back 6d. to 43s. 3d. In other directions, Amalgamated Metal were 12s. 9d., awaiting the dividend decision. General Refractories results are also due shortly; the 10s. shares were quoted at 8s. 10½d. Bradford Dyers preference were 14s. 6d. "ex" the further payment in respect of dividend arrears.

The units of the Distillers Co. reacted to 72s. 9d., but there appeared to be little selling; the market remains hopeful that the dividend may be kept at 16¼ per cent., assuming that the Budget does not bring increased taxation. United Molasses have moved back further on balance, from 29s. 9d. to 29s., but appear to have a firmer appearance at the time of writing. Turner and Newall at 64s. were also lower as compared with a week ago, as were Murex at 86s. 3d., while British Match were 34s. 3d., compared with 34s. 9d. Among other securities, Barry and Staines were 30s. 7½d. and Nairn and Greenwich 55s., but Wall Paper Manufacturers deferred showed a partial rally, following their recent decline, and were 23s. 6d. as against 22s. 7½d. a week ago. Monsanto Chemicals 5½ per cent. preference remained at 22s. 6d.; the financial results are due shortly.

Elsewhere, business at 15s. has been recorded in Cellon 5s. shares, and Goodlass Wall were around 8s. 9d. Pinchin Johnson improved slightly from 20s. 6d to 20s. 10½d., awaiting the annual results, due shortly. Results of William Blythe are also impending; business in the 3s. ordinary shares has been recorded at 7s. 1½d. British Tar Products 5s. shares transferred at 7s. 6d. Boots Drug had a steady appearance at 32s. 9d., and Beechams Pills deferred shares were 10s. 3d. The interim dividend announcement of the last-named company can be expected next month. Among oil shares, Burmah Oil and "Shell" showed a small rally in price.

British Chemical Prices

Market Reports

THERE have been no outstanding features in the industrial chemicals markets during the past week, and in almost every section a strong price position has been maintained. There has been no deterioration in the supply position, and contract deliveries to the chief consuming industries are taking place on a satisfactory scale, and in addition a fair weight of new inquiry is reported. Amongst the soda products chlorate of soda is in strong request while an active inquiry is maintained for hyposulphite of soda, nitrate of soda, and caustic soda. The position of the potash products shows no alteration, there being a steady movement into consumption for priority uses. Oxalic, tartaric, and citric acids continue to be on the short side, and among the other acids the tone remains firm. Formaldehyde continues to be an active market with quotations unchanged while arsenic is available only for approved uses at controlled rates. On the whole the coal tar products continue steady, with a ready market for available supplies. Movements in both crude and crystal carbolic acid are good, and there is a strong demand for creosote oil. Cresylic acid is moving well against existing contracts, but the market is still awaiting details of the control scheme. Only a modest business in the pyridines has been transacted and commercial xylol is a little easier.

MANCHESTER.—Actual price changes on the Manchester market for heavy chemicals during the past week have been few in number, but the general trend is undoubtedly very firm, and a further strengthening in a number of directions in the near future would occasion little surprise. In the meantime, most of the bread-and-butter lines are being called for steadily against contracts, and a moderate weight of new business has been booked. In the by-products section producers of crude tar, creosote oil, and the general run of light distillates are well sold and good quantities are being taken up.

GLASGOW.—In the Scottish heavy chemical trade business in the home trade is rather quiet. Export business is extremely difficult. Prices generally continue very firm. The problem of prompt delivery is also becoming still more acute.

Price Changes

Arsenic.—£41 to £46 per ton, according to quality, ex store.
Carbolic Acid.—Crystals, 10d. to 11d. per lb. Crude, 60's, 4s. 3d. to 4s. 6d., according to specification.
Formaldehyde.—MANCHESTER: £24 to £26 per ton in casks, according to quantity, d/d.
Magnesium Chloride.—MANCHESTER: £14 to £16 per ton.
Pitch.—Medium, soft, 47s. 6d. to 55s., f.o.b.
Sodium Prussiate.—7¾d. to 8½d. per lb., ex store.

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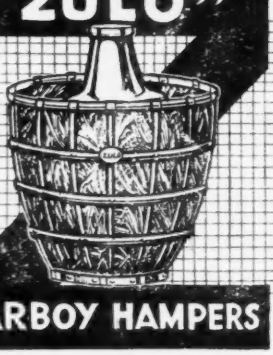

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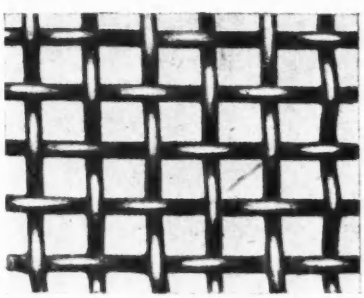

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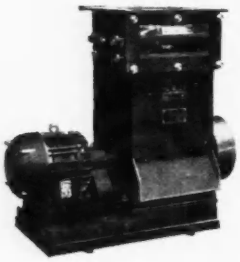

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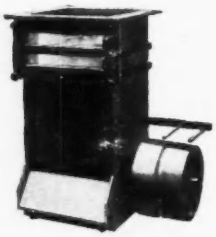

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